

CLAIMS

WHAT IS CLAIMED IS:

1. An exposure apparatus comprising:
an optical system for imaging a pattern formed in a reticle onto an article;
a reticle stage for supporting the reticle;
a motor for positioning the reticle stage and reticle relative to the optical system, the motor having a first portion and a second portion, the first portion of the motor being connected to the reticle stage and movable relative to the second portion of the motor; and
a vibration isolation device configured to isolate vibration resulting from reaction forces created between the first and second motor portions.
2. The exposure apparatus of claim 1 wherein the first motor portion is supported by a stationary support and the second motor portion is supported by the vibration isolation device which is structurally independent of the stationary support.
3. The exposure apparatus of claim 2 wherein the vibration isolation device is connected to the ground.
4. The exposure apparatus of claim 2 wherein the vibration isolation device comprises a bearing configured to allow the second motor portion to move in a direction opposite the first motor portion upon application of the reaction force to the second motor portion.
5. The exposure apparatus of claim 4 wherein the bearing comprises an air bearing.
6. The exposure apparatus of claim 4 wherein the bearing comprises a ball bearing.
7. The exposure apparatus of claim 2 wherein the stationary support comprises a damper.
8. The exposure apparatus of claim 1 wherein the motor comprises a planar motor.

9. The exposure apparatus of claim 1 wherein the motor comprises a linear motor.

10. The exposure apparatus of claim 1 wherein the first motor portion comprises a magnet array and the second motor portion comprises a coil array.

11. The exposure apparatus of claim 10 wherein the vibration isolation device comprises a frame extending from the ground to a location above the reticle stage and wherein the magnet array is connected to an upper surface of the reticle stage and the coil array is connected to the frame at a location above the reticle stage.

12. The exposure apparatus of claim 4 further comprising a flywheel connected to the second portion of the motor for absorbing rotational reaction forces created between the first and second motor portions.

13. The exposure apparatus of claim 1 wherein the article is a wafer.

14. The exposure apparatus of claim 13 further comprising a wafer stage for supporting the wafer and a wafer stage motor for positioning the wafer stage, the wafer stage motor having a coil array and a magnet array, one of the coil array and the magnet array being connected to the wafer stage and movable relative to the other of the coil array and the magnet array, and a wafer vibration isolation device configured for isolating vibration from reaction forces between the magnet array and the coil array.

15. The exposure apparatus of claim 14 wherein the wafer stage motor is a planar motor.

16. The exposure apparatus of claim 14 wherein the magnet array is connected to the wafer stage.

17. The exposure apparatus of claim 1 further comprising a controller for controlling the position of the reticle stage.

18. The exposure apparatus of claim 17 further comprising an interferometer, for providing information on the location of the reticle stage to the controller.

19. The exposure apparatus of claim 14 wherein the wafer stage coil array is supported on a platform having a coolant flowing therethrough.

20. A method of directing reaction forces created between first and second motor portions away from the first motor portion, the first motor portion being attached to a reticle stage for positioning a reticle relative to an optical system, the method comprising structurally isolating the second motor portion from the first motor portion to isolate vibration induced by reaction forces created between the first and second motor portions.

21. The method of claim 20 wherein the step of structurally isolating the second motor portion from the first motor portion comprises supporting the first motor portion by a stationary support and connecting the second motor portion to a frame connected to the ground and structurally independent of the stationary support.

22. The method of claim 20 wherein the step of structurally isolating the second motor portion from the first motor portion comprises supporting the second motor portion on a bearing so that the second motor portion is free to move in a direction opposite the first motor portion.

23. The motor portion of claim 22 further comprising connecting a flywheel to the second motor portion to absorb rotational reaction forces created between the first and second motor portions.